CLAIMS

What is claimed is:

1. A method for operating a combinatorial chemistry system using growth matrix containing structures supportive of an identification encoding technique, comprising:

placing said structures and a reagent into at least one fluidized bed reactor;

operating said at least one fluidized bed reactor to circulate said reagent over said structures;

directing said reagent and said structures entrained within said reagent to a reader station;

uniquely identifying individual ones of said structures using said reader station; and

recording an identity of said structures in association with an identification of the reagent.

2. A method as in claim 1, further comprising:

directing said structures to a collection bin; and

washing said structures prior to reuse of said structures, and continuing the method until said structures have been exposed to a desired plurality of reagents.

3. A method as in claim 1, where said structure emits a signal or signals that identify said structure in response to excitation energy applied by said reader station.

4. A method as in claim 1, where said structure emits a plurality of optical wavelengths that identify said structure in response to excitation energy applied by said reader

station.

5. A method as in claim 1, where there are a plurality of said fluidized bed reactors all capable of simultaneous operation, and where at least two of said plurality of fluidized bed reactors contain different reagents.

6. A method as in claim 1, where said step of operating said at least one fluidized bed reactor to circulate said reagent over said structures comprises constraining said structures to remain within a liquid column with a vertical upward flow that is contained within a downward flow of a surrounding liquid return column.

7. A combinatorial chemistry system that uses growth matrix containing structures supportive of an identification encoding technique, comprising:

a set of fluidized bed reactors individual ones of which are for containing a quantity of said structures and a reagent, and operating to circulate said reagent over said structures;

a reader station for selectively coupling to individual ones of said set of fluidized bed reactors through fluid communication means, said reader station operating to uniquely identify individual ones of said structures as they pass through said reader station; and

a data processor for recording an identity of said structures in association with an identification of the reagent.

8. A system as in claim 7, further comprising a collection bin downstream from said reader station wherein washing of said structures occurs prior to reuse of said structures.

9. A system as in claim 7, where said structure emits a signal or signals that identify said structure in response to excitation energy applied by said reader station.

10. A system as in claim 7, where said structure comprises a material for emitting a plurality of optical wavelengths that identify said structure in response to excitation energy applied by said reader station.

11. A system as in claim 7, where at least two of said plurality of fluidized bed reactors contain different reagents.

12. A system as in claim 7, where each of said fluidized bed reactors operates to constrain said structures to remain within a liquid column with a vertical upward flow that is contained within a downward flow of a surrounding liquid return column.

13. A system as in claim 7, where said set of fluidized bed reactors is comprised of a lower set of reactor vessels and an upper set of reactor vessel flanges.

14. A system as in claim 7, where said set of fluidized bed reactors is comprised of a bottom reactor box that holds a set of *n* fluidized bed reactor vessels and an upper manifold box that holds in place a set of *n* individual mating flanges comprising sealing means, as well as a manifold system comprising *n* valves and *n* pipes for transport of said structures to said reader station.

15. A system as in claim 14, where said bottom reactor box and said upper manifold box are manually separable form one another and manually joinable to one another.

16. A combinatorial chemistry system operable with a set of growth matrix containing structures, comprising:

a set of fluidized bed reactors individual ones of which are for containing a quantity of said structures and a reagent, and operating to circulate said reagent over said structures;

a reader station for selectively coupling to individual ones of said set of fluidized bed reactors through fluid communication means, said reader station operating to uniquely

identify individual ones of said structures as they pass through said reader station by detecting a set of optical wavelengths emitted by each structure, where the set of optical wavelengths uniquely identifies said structure within said set of structures; and

a data processor for recording an identity of said structures in association with an identification of the reagent.

17. A system as in claim 16, further comprising a collection bin downstream from said reader station wherein washing of said structures occurs prior to reuse of said structures.

18. A system as in claim 16, where said structure comprises a material for emitting said set of optical wavelengths in response to excitation energy applied by said reader station.

19. A system as in claim 16, where each of said fluidized bed reactors operates to constrain said structures to remain within a liquid column with a vertical upward flow that is contained within a downward flow of a surrounding liquid return column.

20. A system as in claim 16, where said set of fluidized bed reactors is comprised of a bottom reactor box that holds a set of *n* fluidized bed reactor vessels and an upper manifold box that holds in place a set of *n* individual mating flanges comprising sealing means, as well as a manifold system comprising *n* valves and *n* pipes for transport of said structures to said reader station, and where said bottom reactor box and said upper manifold box are manually separable form one another and manually joinable to one another such that individual ones of said *n* fluidized bed reactor vessels are simultaneously joined with and sealed to said set of *n* individual mating flanges.

21. A method for operating a combinatorial chemistry system using growth matrix containing structures supportive of an identification encoding technique, comprising:

placing said structures and a fluidizing medium comprising a reagent into at least one

fluidized bed reactor;

operating said at least one fluidized bed reactor in accordance with at least one combinatorial variable for mixing said structures with said reagent;

directing said fluidizing medium and said structures entrained within said fluidizing medium to an identification station;

stimulating individual ones of said structures to emit a signal for uniquely identifying individual ones of said structures; and

recording an identity of said structures in association with an identification of the reagent.

22. A method as in claim 21, where said at least one combinatorial variable comprises bead weight.

23. A method as in claim 21, where said at least one combinatorial variable comprises fluidizing medium density.

24. A method as in claim 21, where said at least one combinatorial variable comprises temperature.